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**DEVELOPMENT AND IMPLEMENTATION OF JOINT PROGRAMS IN LASER
RANGING AND OTHER SPACE GEODETIC TECHNIQUES**

Contract NAS5-01113

Quarterly Report 6

For the Period: 1 July 2002 through 30 September 2002

**Principal Investigator
Dr. Michael R. Pearlman**

October 2002

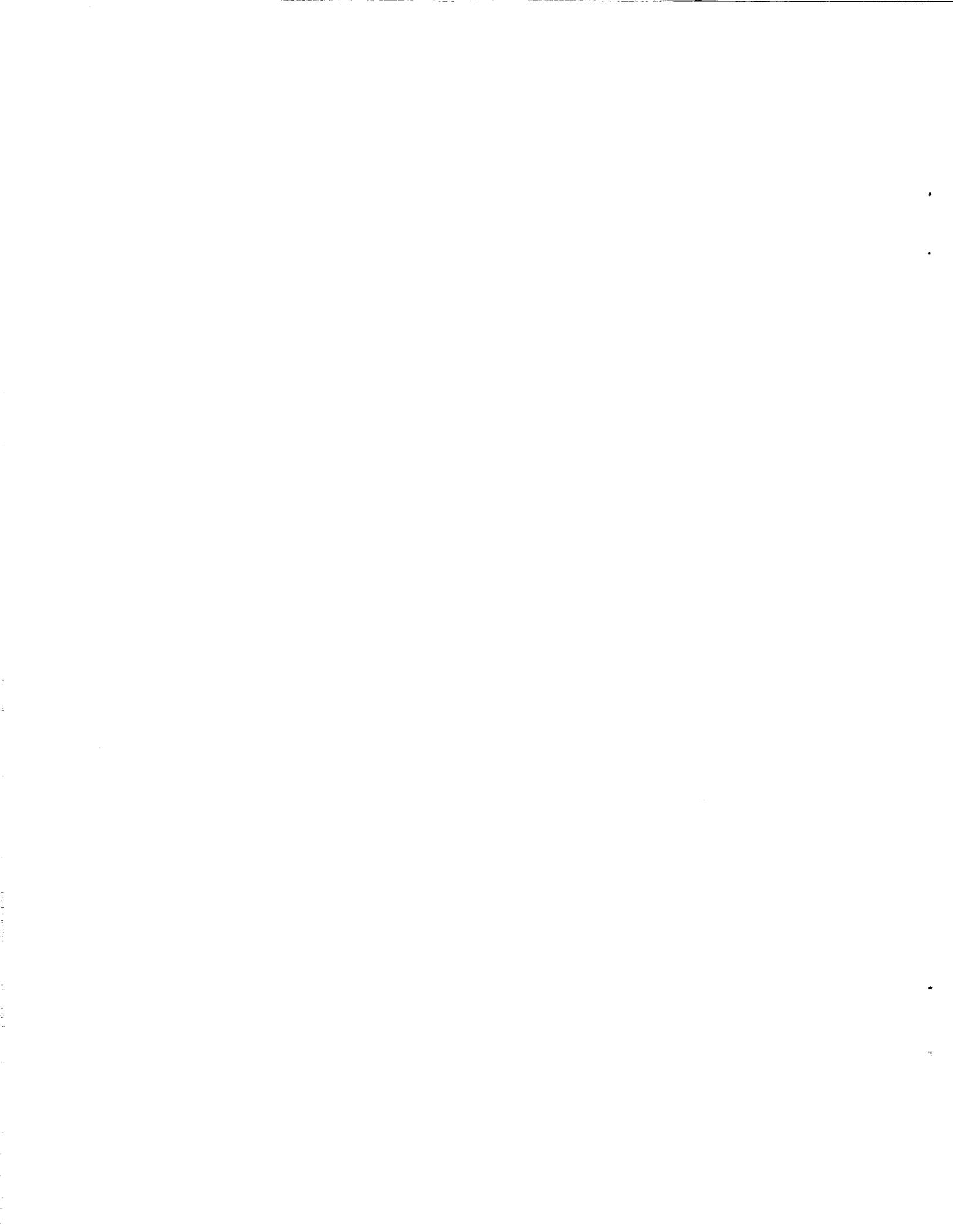
Prepared for

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PROGRESS REPORT

Contract NAS5-01113

1 July 2002 - 30 September 2002

Principal Investigator: Dr. Michael R. Pearlman

INTERNATIONAL PROGRAMS

WEGENER

During this reporting period as the NASA Special Consultant to WEGENER, Dr Pearlman continued to provide program coordination between NASA and the WEGENER Consortium. Pearlman provided technical, organizational, and functional support to the WEGENER Program and worked to facilitate group interaction among the WEGENER participants

The report on the trip to WEGENER 2002 in Vouliameni, Greece was completed (see Ref. 1). Luisa Bastos (see Attachment 1) circulated the notes from the WEGENER Board Meeting.

Arabian Peninsula Programs

The SLR operation in Riyadh continues under the direction of John Gilfoyle.

Asia-Pacific Space Geodynamics (APSG) Program

Pearlman participated in the APSG Meeting in Irkutsk, Russia during the week of August 5.

There was a wide variety of talks on: GPS regional studies in Tien Shan, mainland China, Tibet, Mongolia, Baikal Region, Kurile-Kamchatka and Aleutian Island Arcs; global and regional plate motion measured from the complex of space geodesy data; measurements of changes and interpretation of Earth shape, Earth Structure and crustal motion inferred from gravity field and other geophysical data; Correlation between electrical conductivity of the Earth's crust and the surface motions; Interpretation of altimeter and InSAR measurements on the oceans and land surfaces, Changes in sea level in Lake Baikal and the Okhotsk Sea; airborne remote sensing of volcanoes; measurement reports from Kitab and Altay; and measurements system and service reports on SLR, VLBI, and DORIS. There were also several papers on the monitoring of specific events like Earthquakes and volcanoes. A number of the talks included GPS measurements of the vertical and detection of seasonal effects. There were also several talks on data analysis and archiving provisions.

Tom Herring reported on their measurements in the Tien Shan region over the past ten years. Using about 800 GPS sites, they mapped the velocity field to a standard deviation of less than 2

mm/yr. Many of the sites also yielded well-determined values for vertical motion. Tom also gave a talk for John LaBrecque on the NASA Solid Earth program and the recent Research Announcement. Pearlman gave a presentation on SLR coordination by the ILRS and also a talk on SLR 2000 provided by John Degnan. There were also a few talks on VLBI, DORIS, SAR, and airborne sensing. The presentations will be assembled into proceedings; manuscripts are due 15 November.

A business meeting was held on Thursday morning and a GPS Network "Working Group" meeting was held on Thursday afternoon. Resolutions adopted at the meeting are attached. Dr. G. A. Sobolev, the meeting chair (along with Dr. Shuhua Ye), who is from the Geophysical Center of the Russian Academy of Sciences in Moscow, is very impressive and was instrumental in keeping the meeting well organized and structuring future activities.

The Russians discussed the GEO-IK satellite series, which included nine altimeter satellites launched over the decade from 1985-1995. The altimeters were a surprise to most of the non-Russians. The Russians did say that the altimeter data could be accessed, but the mechanism was not clear. (Contact Petr Medvedev to pursue this further). The next GEOIK satellite series with altimeters will begin in 2003.

The Geophysical database for all sources of data was again discussed (originally discussed in Tahiti). They do not plan to duplicate data archived elsewhere, but rather provide links where appropriate. Ding Xiaoli from Hong Kong and the Shanghai Observatory agreed to try to get this going. Although the ground-based measurement activities in the APSG region are growing rapidly, there is still little provision to integrate the work. There has also been some problem with data distribution, especially in China. Those working with the Chinese have in some cases only been able to analyze their data in China. It was agreed that the networks should make more effort to cooperate. There is also a desire to baseline the analysis efforts. A test set of data will be made available for the separate groups to analyze and compare results. It was agreed that a networks and analysis meeting should be held next year in Bishkek, Kyrgyzstan, to be hosted by the Research Station UIHT (RAS). Dr. Sobolev will help organize the meeting.

The Resolutions from the meeting are included in Attachment 2.

International Laser Ranging Service (ILRS)

ILRS Meetings in Washington DC.

Preparations are being made for the Eighth General Assembly of the ILRS in Washington DC. on October 10, and the other ILRS Working Group Meetings during that week. Details on the meetings can be found at http://ilrs.gsfc.nasa.gov/what_new/ilrs_agenda.html

Central Bureau

Central Bureau meetings have been held monthly during this reporting period. With the tremendous help from Van Husson, Carey Noll, and Scott Wetzel, Pearlman continued to oversee

the daily activities of the service.

The ILRS Annual Report for 2001 is awaiting completion of Section 1 and will then be ready for printing. A draft outline for Annual Report 2002 has been prepared for presentation at the General Assembly Meeting. This report will be more of a summary than the previous reports.

Van Husson issued the Second Quarter 2002 Stations Report Card in September. Work continues on the Site Log file on the web site. Work also continues on the "range bias file". For the most part, discrepancies between the CDDIS and EDC databases have been cleaned up. The data Q/C routine has still to be installed on the EDC database. The ILRS website has been considerably updated.

Predictions

Sub-daily predictions continue to help tracking on low satellite. Work continues at HTSI and CSR to include GPS data in the prediction cycle in preparation for ICESAT. The EUROLAS on line prediction update and station status reporting has improved tracking. Some of the NASA stations are now using it.

Satellites

The Etalon Campaign will continue through the end of October. The Analysis Working Group will provide an assessment at the General Assembly in Washington. The campaign on REFLECTOR is scheduled to run through the end of the year. Some data on the returns from the distributed array has already been made available. Data continues to be plentiful on Jason and Topex; the anticipated maneuver of TOPEX was completed in September. With the separation increase to 6 minutes, more pass interleaving is being attempted. Tracking on ENVISAT and ERS-2 (in tandem) is proceeding routinely.

The GRACE satellites were launched in mid-March with 30-second separation. The official tracking request (for each station) is for alternate successful passes unless precluded by visibility. A few stations are testing pass interleaving which may be an eventual network option. Prediction and drag functions are being issued by GFZ.

Stations

The TIGO System is operational in Concepcion, Chile, and data is flowing into the data centers. The MLRO at Matera is still undergoing acceptance testing, but some data is flowing through operational channels. Most impressive are the satellite rotation results seen from frequency analysis of the range data. A new SLR station in Lviv, Ukraine had requested membership in the ILRR.

A Chinese fixed SLR system is being readied for deployment to San Juan, Argentina sometime this year.

The Mt. Haleakala system continues to operate in a reduced mode while the system renovation nears completion. Data yield has been increasing, with some impressive results.

The FTLRS operation at Ajaccio, Corsica continues in support of the oceanographic satellites.

Stations Qualification

The Station Qualification document as revised by the Analysis Working Group was circulated to the ILRS Governing Board Members for approval, but there is still some reservation about its implementation. This topic will be discussed at the Governing Board Meeting in Washington. At the moment we have incomplete stations that are requesting ILRS membership, and we have no means to categorize them as less than operational.

Site Surveys

Chopo Ma and Jim Long have organized a survey splinter meeting at the Laser Workshop to familiarize the stations with require survey procedures. A survey of the GSFC site will be used as an example.

Upcoming Meetings

Eighth ILRS General Assembly and ILRS Splinter Meetings

The Eighth General Assembly of the ILRS will be held at EGS in Washington on the afternoon of October 10. The Governing Board Meeting and most of the Working Group Meetings will also be held during that week. The Analysis Working Group has scheduled its meeting for October 3 and 4 in Washington. We have established a tradition of focussing on the missions at the spring meeting where the user community is likely to attend, and stressing more the SLR engineering and operations in the fall in association with either the Laser Workshop or a specialize meeting for SLR practitioners.

Thirteenth International Workshop on Laser Ranging

The Thirteenth International Workshop on Laser Ranging will be held at the Hyatt Regency in Washington DC during October 7-11. Dr. Pearlman, John Degnan, Carey Noll, and Kathy Regul (a GSFC Contractor) now constitute the Local Organizing Committee. Carey Noll has prepared a Workshop website http://cddisa.gsfc.nasa.gov/lw13/lw_home.html and circulars have been issued. Also see Attachment 3.

Pearlman has been spending much of his time working with Carey Noll and John Degnan on the organization of the meeting. We have a very packed schedule (see web site) and expect approximately 150 participants. Accommodation for vendor booth has been included in the meeting to help defray some of the costs.

Support for the NASA Network

Data Engineering

The SLR Data Engineering Panel met regularly during this period, focussing most of its efforts on the activities of the ILRS, but some time was spent on performance assessment of the stations.

SLR Operations

Pearlman continued to provide technical and operational support and overview for NASA in the field of laser ranging, including system performance evaluation, system diagnosis, and system engineering, and provided technical support to the HTSI engineering and software staff. He also participated in bi-weekly SLR telephone conferences.

Pearlman and David Carter are planning a trip in late October to Concepcion, Chile to visit the TIGO and to Arequipa, Peru to visit the station and for administrative discussions with the University of San Agustin. A trip in November to Mount Haleakala and Tahiti are also being discussed.

References

1. Trip to Vouliagmeni, Greece to participate in the Eleventh General Assembly of WEGENER and the WEGENER Board Meeting on June 12 - 14, 2002, dated July 11, 2002.
2. Trip to Irkutsk, Russia to participate in the International Seminar "On the Use of Space Techniques for Asia-Pacific Crustal Movements Studies", on August 5 - 10, 2002, dated September 3, 2002.

WEGENER BOARD Meeting

Athens, June, 14, 2002
16 h 30– 19h, Hotel Armonia

AGENDA

1. Adoption of the Agenda
2. WEGENER Database
 - 2.1. Processing and Submission Guidelines - Presentation of the Document
 - 2.2. Possibilities for establishing a WEGENER Combination Center
 - 2.3. WEGENER and FP6 - Prospects
3. Other WEGENER initiatives
4. WEGENER 2002 General Assembly
 - 4.1. Conclusion
 - 4.2. Proceedings
5. Other information/topics

Present:

Luisa Bastos, Boudewijn Ambrosius, John Degnan, Bernd Richter, Susanna Zerbini, José Davila, Mathias Becker, Robert Reilinger, Hans-Gert Kahle, Costas Papazachos, Fabio Rocca, Wim Spakman, Michael Pearlman, Paolo Tomasi, Irina Kumkova, Ludwig Combrinck.

Excused:

Brian Blair, Giuseppe Bianco, Seth Stein, John LaBrecque Steve Nerem, Detlef Wolf, Carine Bruyninx, Trevor Baker, Geoffrey Blewitt, Surya Tatevian.

Not present:

Hans-Georg Scherneck, Bjorn Engen, Muftah Unis, Dalal Alnaggar.

ATTACHMENT 1

Upon request from Luisa, Rui Fernandes attended the meeting to help with the minutes.

Point 1 – Adoption of the Agenda

Bernd Richter requested sometime to make an announcement before the beginning of the meeting.

Due to BKG policies, Bernd has to leave the WEGENER Board. However Bernd expressed his availability to continue to give support in work related to Reference Systems and also his will to continue to be a member of the WEGENER community.

On behalf of the WEGENER board, Luisa thanked the excellent collaboration that Bernd always gave and expressed the board wish that he continues to contribute with his experience and knowledge to the success of WEGENER.

The meeting started with the approval of the agenda as proposed.

Point 2 - WEGENER Database

2.1. Processing and Submission Guidelines - Presentation of the Document

As decided in the Nice meeting, a document containing guidelines for processing procedures for solutions to be submitted to a future WEGENER data Base was prepared by Mathias Becker, Carine Bruyninx and Rui Fernandes. Mathias Becker briefly presented the document "Processing and Submission Guidelines for GPS Solutions to be integrated to a WEGENER Data Base". This document has been previously sent to all board members for comments.

If Luisa does not receive anymore comments/inputs, the document will be made available at the WEGENER Web page on its actual form.

2.2. Possibilities for establishing a WEGENER Combination Center

There was some discussion about the usefulness and opportunity to establish a WEGENER Data Base Center in view of the fact that there are already some similar successful initiatives running (like GPSVel, IGS and EUREF).

Mike expressed his concern about overlapping with other groups. Rob suggested a contact with GPSVel to profit from their expertise and experience and possibly to have some integration between the initiatives.

Luisa explained that this data center would not overlap with others. It will not duplicate services, therefore if data is already available with the specifications required by the WEGENER community, the WEGENER Data Center will use it directly. However, the WEGENER Data Center will not only use data from IGS/EUREF stations (which form a network with stations apart more than 100 km, on average) but also from closer stations. In addition WEGENER is interested also in having data from non-permanent stations. This means that data collected from groups doing episodic campaigns will be welcome and encouraged. WEGENER will have an active role in getting data by contacting directly these groups and proposing an exchange of services: the WEGENER data Center provides a standardize solution produced using the WEGENER guidelines, therefore guaranteeing the quality of the results, so the group will get an independent solution for his network; in return this group assumes the compromise to release the data after sometime (no more than two years after data acquisition). These can be of interest for groups with less resources and experience as it allows a faster way of producing high quality results.

Irina agreed that this could be good for special/episodic campaigns. John recall that a lot of databases already exists.

Luisa stressed the point that WEGENER is looking to small scale networks and not only to regional scale as EUREF and IGS.

Ludwig said that the database should include log sheets for all stations with precise information about station description.

Susanna pointed out the interest of having detailed information about the behavior of time series. A complete geological information of each station is indispensable and at the moment this is not available.

Mike said that this would be difficult because for the VLBI network, with only 40 stations this is already a problem.

Paolo expressed the opinion that this database should not be restricted to GPS information only because then its interest is reduced.

Luisa agreed but said that we should go by small steps in order to start. If we want to have everything from the beginning then it will be too difficult and we will never start. One possibility could be to select a case-study area where all kinds of geo-data would be gathered and integrated.

Mike recommended that we profite from existing services (IGS, VLBI, etc.).

Luisa said that the WEGENER processing center would only process again sites that are not processed by other agencies (assuming that the available solutions are reliable and the procedures used clear).

Hans-Khale asked what was the project time frame. Luisa said that it is reasonable to expect a two year implementation period and the service must be guaranteed for at least ten years. However it is expected that meanwhile other WEGENER Centers appear.

Boudewijn asked Luisa how she would start the Center implementation. With Portuguese money? Luisa said that she expects some local support, including from the University of Porto. Another possibility is to look for EU support within the 6th framework program.

Mathias said that there is now an opportunity to get money from EU, specially if a lot of different disciplines are involved.

Wim Spakman said that a similar Center already exists for seismology and that he approves the idea to have a central site where all data is stored. It is very convenient for researchers that want to initiate studies in a specific area.

John said that such a center could be a place where graduate students could learn a lot.

Susanna said that this center could do some actions in order to guarantee the quality for non-IGS or non-EUREF sites.

Rob said that instead of just a processing center this could be a training center. He asked Susanna if IAG would support this kind of activity. Susanna answer that it is possible.

Mathias asked Costas Papazachos if in geology there exists this kind of center. Costas said that it is important to have a data center. It could be a Center of Excellence.

Susanna said that it could also be either a "Center of Excellence" or an "Integrated Project" but that this demands for the involvement of a large number of Institutes. In a "Network of Excellence" we have less research and more creation of infrastructures. An "Integrated Project" involves more research.

Luisa said that a "Network of Excellence" might be better for this case.

Boudewijn suggested that we start with a small center and afterwards we see where we can go.

Luisa asked for suggestions of a study area. Susanna mentioned that North-Adriatic. Mathias suggested Greece. Rob said that for the Marmara Sea region there exists a lot of different type of data, already published and consequently freely available.

Susanna said that the idea is to select a region where we can really integrate all data. Rob agreed that Italy could be a possibility.

Susanna suggested that we first think of what we really want to achieve with the project.

Ludwig and Wim were of the opinion that it is better to start only with the database.

Luisa will start contacts in Portugal to find support to set up this initiative.

Point 3 - Status of pending WEGENER initiatives

Luisa mentioned that recently there was some misunderstood concerning WEGENER focus. She explained that some of the WEGENER board members did not attend the meeting apparently because they had the idea that Post-Glacial Rebound was not anymore a hot topic for WEGENER and therefore they choose other priorities for attending meetings.

Paolo said that there is a lack of presentations about vertical motions, so maybe this was due to a degradation of interest of WEGENER about the topic. Maybe the Science advisor should do something.

Rob: we should stress the importance of the vertical motions in the final conclusions.

Khale asked what was the situation with the colleagues from CEI. Were they invited to participate?

Susanna explained that they are in another commission. Spakman informed that they have their own funds to pursue their activities and we should not interfere with that. Khale said that it would be interesting to contact them.

Luisa asked if Susanna knew how would be the IAG structure for the next period. Commission XIV will become a subcommission and therefore WEGENER has to be changed.

Point 4 – WEGENER 2002 General Assembly

4.1. Conclusion

As a session for discussion meeting conclusions took place in the Meeting Closing session, just before the Board meeting, there were no more comments on this topic.

4.2. Proceedings

Concerning proceedings, Luisa suggested that some attempt to publish the proceedings as a special issue of a journal should be made.

Mike stressed that with so many different topics in WEGENER papers it might be difficult to find a journal that accept this.

Susanna said that this should not be a problem and usually some journal do it.

Khale wondered about having proceedings with referee system or not because it should be considered that a lot of presentations containing useful information maybe discarded.

Rob call the attention to the fact that some presentations were/are being submitted to journals therefore could not be included in a referee system procedure.

John said that some people would not make the effort just to publish in proceedings.

Dávila suggested that we pick just some papers to be submitted to the special publication but Susanna has the opinion that this is not pleasant.

Costas suggested that we ask first people about their plans and after make a final decision.

Rob warned about the problems with long publishing time but Susanna thinks that this might not be a problem, it depends on the editor.

John said that is paper mine was not good for a journal but would fit in a technical report.

Luisa agreed with Costas suggestion and give the idea of having the two kinds of papers. A quick publication with all presentations (without referee) that the local organising Committee prepares and a special issue of a journal for selected papers.

Point 5 – Other information

Rob informed that Ayut Barka died last February.

John informed that Tom Clark retired and that he has now no funds to travel. He will check what is his situation concerning WEGENER.

Susanna and Mike commented that there should be some changes in the board in order to cope with those situations.

John informed that the next SLR meeting would be in Washington in October.

The Board accepted the offer from the colleagues from Morocco for the organisation of the Next WEGENER Assembly therefore it was decided that the next WEGENER Assembly will take place in Morocco between May and June in 2004.

As no other topics were presented for discussion, the meeting was closed around 19h.

RESOLUTIONS

**International Seminar on the Use of Space Techniques for Asia- Pacific
Regional Crustal Movements Studies.(APSG-Irkutsk, 2002)
IRKUTSK, RUSSIA
5-10 August, 2002.**

The Seminar - **APSG-Irkutsk, 2002** was organized into plenary sessions on the topics, mainly concerning the studies of recent crustal movements in the Central and Southeast Asia with the use of space geodesy techniques. There were 45 participants from 7 countries taking part in the meeting; more than 30 papers on major scientific results were presented. A round table discussion organized after the scientific sessions identified items that the national scientific institutions and groups involved in geodynamic studies within the frames of the APSG Project, should address:

- 1) densification of the Central and Eastern Eurasian GPS permanent geodynamic network, as there are still problems with seismic zone definition and determination of the small tectonic blocks borders;
- 2) improvement of the SLR network coverage in the area of Central Asia and South Siberia to strengthen the global coverage of the international global SLR network, which provides the geocentric coordinate reference frame for regional geodynamic studies;
- 3) collocation of different space geodesy techniques (including gravity measurements and astronomical observations) at the fiducial sites in the region;
- 4) installation of collocated tide gauges and GPS/DORIS instruments at site in the Far East sea coast of Russia for the monitoring of sea level and temporal variations in land height;
- 5) improvement of the links of the IGS and APSG data centers with the World Geophysical Centers and involvement of the Space Geodesy data bases in the WDC on-line information system;
- 6) creation (in the frames of the APSG Measurement Techniques Panel) of a temporary Working group on the unification of GPS field measurements methods and data standards;
- 7) strengthening the attention to the problems of dynamic modeling of the mantle and developing processes in the crust, as well as the interpretation and analysis of scientific information from the new geophysical satellite missions (GRACE, CHAMP, JASON, etc); and
- 8) taking into account the valuable results obtained by Russian and Chinese specialists on the development of local geodynamic GPS networks in the area of the APSG Project , recommend to the Chinese and Russian Institutes that they join their efforts to enlarge bilateral cooperative programs for intensive studies of the deformation in the area of Central Asia- Tibet – Pamirs.

ATTACHMENT 2

15:06	15:28	Future Interplanetary Laser Ranging; Science Goals and Methods (Invited)	K. Nordtvedt
15:30	15:50	<i>Break</i>	
15:50	17:40	Scientific Achievements, Applications, and Future Requirements	R. Noomen, S. Klosko
15:50	16:10	Geophysical Applications of SLR Tidal Estimates (Invited)	J. Wahr
16:10	16:30	Laser Ranging Contributions to Monitoring and Interpreting Earth Orientation Changes (Invited)	R. Gross
16:30	16:50	Monitoring the Origin of the TRF with Space Geodetic Techniques (Invited)	E. Pavlis
16:50	17:10	Absolute Earth Scale from SLR Measurements (Invited)	P. Dunn
17:10	17:25	First Results of the French Transportable Laser Ranging Station during the 2002 Corsica Campaign for the JASON-1 Calibration and Validation Experiment	J. Nicolas
17:25	17:40	Preliminary Orbit Determination of GRACE Satellites using Laser Ranging Data	J. Zielinski
18:00	19:30	<i>Reception at Hyatt Regency</i>	
19:30	21:00	Networks and Engineering Working Group Meeting	W. Gurtner
21:00	22:30	Prediction Format Study Group Meeting	R. Ricklefs

Tuesday, October 08, 2002

08:30	09:30	Laser Technology Development	K. Hamal, H. Donovan
08:30	08:45	Lasers for Multiwavelength Satellite Laser Ranging	K. Hamal
08:45	09:00	Kilohertz Laser Ranging at Graz	G. Kirchner
09:00	09:15	High-Power, Short-Pulse Microlaser - Power Amplifier System	P. Moulton
09:15	09:30	Mechanical measurement of laser pulse duration	J.-L. Oneto
09:30	10:35	Improved or Upgraded Systems – Poster Summaries	F. Pierron, Y. Fumin
09:30	09:35	SLR2000 Software: Current Test Results and Recent Developments	J. McGarry
09:35	09:40	McDonald Ranging: 30 Years and Still Going	P. Shelus
09:40	09:45	Replacement of the LURE Telescope Controller Using COTS Components Using Commercial Off-The-Shelf Components	D. O’Gara
09:45	09:50	System Stability Improvement of Changchun SLR System	Y. Zhao
09:50	09:55	Improving SALRO Accuracy	A. Azzeer
09:55	10:00	Ultra mobile station FTLRS: Software Control	M. Pierron
10:00	10:05	The New MLRS Encoder System: Progress Report	J. Wiatt
10:05	10:10	Improvements of the French Transportable Laser Ranging Station to high accuracy level	F. Pierron
10:10	10:15	Upgrading of the Simeiz-1873 SLR Station	S. Filikov
10:15	10:20	First Laser Ranging Results of the new Potsdam SLR System	L. Grunwaldt
10:20	10:25	System Upgrades of the NASA SLR Network	D. Carter
10:25	10:30	Upgrades of Shanghai Satellite Laser Ranging Station	Y. Fumin
10:30	10:35	NASA SLR Network MCP PMT Upgrade	H. Donovan
10:35	11:00	<i>Break and Poster Viewing</i>	

11:00	12:30	Timing Devices	E. Samain, P. Gibbs
11:00	11:15	ILRS Timing Devices: Specifications, Error Analysis, BEST Calibration Practices	V. Husson
11:15	11:30	Range comparison results for various EUROLAS SR timers	P. Gibbs
11:30	11:45	Counter Calibrations at Zimmerwald	W. Gurtner
11:45	12:00	Portable – Pico Event Timer Upgrade	K. Harnal
12:00	12:15	A010 Family of Time interval Counters Adapted to SLR Applications	Y. Artyukh
12:15	12:30	An ultra stable event timer	E. Samain
12:30	12:35	Operational Performance of GPS Steered Rubidium Oscillators (Poster Summary)	L. Stewart
12:35	14:00	<i>Lunch</i>	
14:00	15:30	Detectors and Optical Chain Components	G. Kirchner L. Grunwaldt
14:00	14:15	New Detection Package at Graz	G. Kirchner
14:15	14:30	The advantages of Avalanche Photodiode (APD) arrays in laser ranging applications	E. Samain
14:30	14:45	Characterization of a Microchannel Plate Photomultiplier Tube with a High Sensitivity GaAs Photocathode	J. Strasburg
14:45	15:00	Time walk compensation of a SPAD with linear photo detection	I. Prochazka
15:00	15:15	SPAD Detector Package for Space Born Applications	J. Martin
15:15	15:30	Testing of MCP PMTS: Use of Fiber Optic Coupled Gbps Laser Drivers to Create Ersatz Laser Return Pulses	T. Cuff
15:30	15:50	<i>Break</i>	
15:50	18:00	Automation and Control Systems	J. McGarry, F. Koidl
15:50	16:10	Berne/Herstmonceux Timebias Service	R. Wood
16:10	16:30	Intelligent Scheduler, Prioritize on the Fly	C. Clarke
16:30	16:35	Incorporation of GPS Data into HTSI Prediction Cycle to Support the ICESat Mission (Poster Summary)	J. Horvath
16:35	16:55	Improvements in the Automation of the Zimmerwald SLR Station	W. Gurtner
16:55	17:15	Automated Operational Software at the Shanghai SLR Station	Z. Zhang
17:15	17:20	Sun Avoidance Software (Poster Summary)	Z. Zhang
17:20	17:40	Infrared Sky Camera – The Production Model	T. Mallama
17:40	18:00	SLR2000: Closed Loop Tracking with a Photon-Counting Quadrant Detector	J. McGarry
18:00	19:30	Data Formats and Procedures Working Group Meeting	W. Seemueller
19:30	21:00	Missions Working Group Meeting	S. Wetzel

Wednesday, October 09, 2002

08:30	09:30	Lunar Laser Ranging	P. Shelus, J.F. Mangin
08:30	08:45	Recent contributions to LLR analysis	P. Shelus
08:45	09:00	The OCA LLR Station: An Update	G. Vigouroux
09:00	09:15	APOLLO: Multiplexed Lunar Laser Ranging	T. Murphy

09:15	09:30	LLR Developments at Mount Stromlo: Towards Millimeter Accuracy	J. Luck
09:30	10:00	<i>Break and Poster Viewing</i>	
10:00	12:00	Station Performance Evaluation	C. Luceri, R. Wood
10:00	10:15	MyStationPerformance.COM	V. Husson
10:15	10:30	The Precise Data Processing in MCC Analysis Center	V. Glotov
10:30	10:45	The stability of the SLR stations coordinates determined from monthly arcs of LAGEOS-1 and LAGEOS-2 laser ranging in 1999-2001	S. Schillak
10:45	11:00	Range Bias vs. Applied System Delay	T. Otsubo
11:00	11:15	Absolute and Relative Range Bias Detection Capabilities	V. Husson
11:15	11:30	Status of the KACST SLR Program – Past, Present and Future	T. Al-Saud
11:30	11:45	Results of the triple laser ranging collocation experiment at the Grasse observatory, France (September - November 2001)	J. Nicolas
12:00	15:00	<i>Lunch and Free Time</i>	
12:00	15:00	ILRS Governing Board Meeting	M. Pearlman
13:30	15:00	Local Surveys for SLR: A Primer (splinter session)	J. Long
15:00	16:30	System Calibration Techniques	I. Prochazka, U. Schreiber
15:00	15:15	Use of free surface of liquids in interferometric methods: application to split corner cubes	J.-L. Oneto
15:15	15:30	Portable Calibration Standard Capabilities	K. Hamal
15:30	15:45	Portable Calibration Standard Mission Review	I. Prochazka
15:45	16:00	High accuracy short range laser rangefinder for system calibration and installation	P. Sperber
16:00	16:15	An experimental common detector, coaxial Cassegrain laser telescope and its calibration	M. Paunonen
16:15	16:20	Local Surveys at Goddard	J. Long
16:20	16:25	Local Survey Relationships to System Calibration and Bias Identification	P. Stevens
16:30	17:30	Station Operational Issues	W. Gurtner, V. Husson
16:30	16:40	Creating a Consolidated Laser Ranging Prediction Format	R. Ricklefs
16:40	16:55	Operational Issues from the Stations	W. Gurtner
16:55	17:10	Operational Issues from an ILRS Central Bureau Perspective	V. Husson
17:10	17:20	Operational Issues from the Viewpoint of the SLR Data Analysis	G. Appleby
17:20	17:30	General Discussion	W. Gurtner
18:00	22:00	<i>Excursion to GGAO for tour and barbeque hosted by HTSI</i>	

Thursday, October 10, 2002

08:30	10:35	Target Design, Signatures, and Biases	G. Appleby, V. Vasiliev
08:30	08:45	Retroreflector Array Transfer Functions	D. Arnold
08:45	09:00	Difference of LAGEOS satellite response from raw data analysis of the collocation experiment between the Grasse Satellite and Lunar Laser Ranging stations	J. Nicolas

09:00	09:15	Recovery of target response function for centre-of-mass corrections of spherical satellites	T. Otsubo
09:15	09:30	International experiment in space for investigation of a novel-type laser retroreflector	V. Vasiliev
09:30	09:45	Development and on-orbit performance of moderate-cost spherical retroreflector arrays for the STARSHINE program	R. Kessel
09:45	10:00	Reflector arrangement on H2A-LRE satellite	T. Otsubo
10:00	10:15	The Atmospheric Neutral Density Experiment: a Mission Overview	A. Nicholas
10:15	10:20	Velocity Aberration (Poster Summary)	D. Arnold
10:20	10:25	Design of a laser retro-reflector for the first satellite ranging mission in S. Korea on an elliptical orbit (Poster Summary)	S. Kim
10:25	10:30	Laser Retroreflector Array (LARA) for IRS Mission (Poster Summary)	K. Elango
10:30	10:35	LAGEOS-2 spin rate and orientation (Poster Summary)	R. Wood
10:35	10:50	<i>Break</i>	
10:50	13:10	Atmospheric Correction and Multiwavelength Ranging	S. Riepl, E. Pavlis
10:50	11:05	Validation of Mapping Functions	S. Riepl
11:05	11:20	Zimmerwald Dual-wavelength Operation: First Experiences	W. Gurtner
11:20	11:35	Two-color laser ranging with the MLRO system	G. Bianco
11:35	11:50	Atmospheric Refraction at Optical Wavelengths: Problems and Solutions	E. Pavlis
11:50	11:55	Preliminary estimation of the atmospheric nonlinear frequency dispersion and absorption effects on the pulse SLR accuracy (Poster Summary)	Y. Galkin
11:55	12:10	Wavelength Dependence of Range Correction	D. Arnold
12:10	12:25	Atmospheric Contribution to the Laser Ranging Jitter	I. Prochazka
12:25	12:40	Modification of Laser Ranging Equation	X. Yaoheng
12:40	12:55	A Database of Atmospheric Refractivities from GPS Radio Occultations	M. Torre Juárez
12:55	13:10	Biaxial Rayleigh- and Raman-LIDAR for applications in atmospheric sounding and SLR	U. Schreiber
13:10	14:30	<i>Lunch</i>	
14:30	15:30	Advanced Systems and Techniques	B. Greene, T. Murphy
14:30	14:45	Millimeter Ranging Accuracy – The Bottleneck	I. Prochazka
14:45	15:00	SLR2000: Progress and Future Applications	J. Degnan
15:00	15:15	Optimization of the Correlation Range Receiver Parameters in SLR2000	J. Degnan
15:15	15:30	Overview of Data for the SLR2000 Tracking Mount Performance Testing	D. Patterson
15:30	15:50	<i>Break</i>	
15:50	16:45	Advanced Systems and Techniques	B. Greene, T. Murphy
15:50	16:05	Laser Tracking of Space Debris	B. Greene
16:05	16:20	Installing TIGO in Concepcion	S. Riepl
16:20	16:35	The MLRO Project: a Status Report	G. Bianco
16:35	16:40	Photon-Counting Airborne Microlaser Altimeter (Poster Summary)	J. Degnan
16:40	16:45	Time Transfer by Laser Link (Poster Summary)	E. Samain

19:00 22:00 *Banquet at The Commons, Smithsonian Castle Building,
Smithsonian Institution*

Speakers:

Dr. Mary Cleave, NASA Deputy Administrator for Earth Sciences and Former Astronaut

Dr. Henry Plotkin, UMBC Center for Advanced Studies in Photonics Research

Mr. Richard Stamm, Keeper of the Castle Collection, Smithsonian Institution

Friday, October 11, 2002

08:30	10:30	ILRS General Assembly	M. Pearlman
<i>10:30</i>	<i>10:50</i>	<i>Break</i>	
10:50	12:00	ILRS General Assembly	M. Pearlman
12:00	13:30	Workshop Summary/Resolution/Closure	



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